SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-41

Name: Brant Lake **County**: Lake
Legal Description: T105N- R51W-Sec. 3, 4, 9, 10
Location from nearest town: 2 miles north of Chester, SD

Dates of present survey: July 21-23, 2008 (netting); Sept. 4, 2008 (electrofishing)
Dates of last survey: July 23-25, 2007 (netting); Sept. 4, 2007 (electrofishing)

Primary Game Species	Other Species
Walleye	Northern Pike
Smallmouth Bass	Bluegill
Yellow Perch	Black Bullhead
Black Crappie	Channel Catfish
	Bigmouth Buffalo
	Common Carp
	White Sucker
	Spottail Shiner
	Green Sunfish
	Hybrid Sunfish
	White Bass

PHYSICAL DATA

Surface area: 1,037 acres
Maximum depth: 14 feet
Volume: 11,000 acre-feet
Contour map available: Yes
OHWM elevation: 1598.3
Outlet elevation: 1597.3
Watershed area: 7,658 acres
Mean depth: 11 feet
Shoreline length: 6.2 miles
Date mapped: November, 2002
Date set: December, 1981
Date set: February, 1987
Lake elevation observed during the survey: Full
Beneficial use classifications: (4) warmwater permanent fish life propagation, (7) immersion recreation, (8) limited contact recreation and (9) wildlife propagation and stock watering.

Introduction

Brant Lake, located just north of Chester, is fourth in a chain of four natural lakes formed by receding glaciers at the end of the last ice age. It derived its name from the large number of white brant (snow geese) that occupy the area during the spring and fall migrations. Brant receives most of its water from lakes Herman, Madison and Round, the upper three lakes in the chain, via Silver Creek. Additional inputs come from the relatively small, local watershed. Outflows form the headwaters of Skunk Creek, which flows into the Big Sioux River in Sioux Falls.

Ownership of Lake and Adjacent Lakeshore Properties

Brant Lake is listed as meandered public water in the State of South Dakota Listing of Meandered Lakes and the South Dakota Department of Game, Fish and Parks (GFP) manages the fishery. GFP also owns and maintains access areas on the east, south, and west sides of the lake. The remainder of the shoreline property is privately owned.

Fishing Access

The East Brant Access Area has a double lane boat ramp, dock and large parking lot. The West Brant Access Area has a beach suitable for launching small boats with a 4-wheel drive vehicle and several shore fishing areas. A boat ramp is planned for the West Brant Access Area. The South Brant Access Area also offers shore fishing opportunities.

Field Observations of Water Quality and Aquatic Vegetation:

In spite of a moderate algae bloom, water clarity was good this year with a Secchi depth measurement of 1 m (39 in). Scattered, sparse beds of sago pondweed (*Potamogeton pectinatus*) were found throughout the lake and cattails (*Typha spp.*) were observed at the west end.

BIOLOGICAL DATA

Methods:

Brant Lake was sampled on July 21-23, 2008 with six overnight gill-net sets and 11 overnight trap-net sets. The trap nets are constructed with 19-mm-bar-mesh (¾ in) netting, 0.9 m high x 1.5 m wide (3 ft high x 5 ft wide) frames and 18.3 m (60 ft) long leads. The gill nets are 45.7 m long x 1.8 m deep (150 ft long x 6 ft deep) with one 7.6 m (25 ft) panel each of 13, 19, 25, 32, 38 and 51-mm-bar-mesh (½, ¾, 1, 1¼, 1½, and 2 in) monofilament netting. Two hours of nighttime electrofishing were done on September 4, 2008 to evaluate walleye recruitment. Sampling locations are displayed in Figure 8.

Results and Discussion:

Gill Net Catch

Yellow perch (28.5%), white bass (19.9%), walleye (17.4%), and black bullhead (8.5%) were the most abundant species sampled in the gill nets (Table 1). Nine additional species were also sampled.

Table 1. Total catch from six overnight gill-net sets at Brant Lake, Lake County July 21-23, 2008.

Species	#	%	CPUE[1]	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Yellow Perch	90	28.5	15.0	±3.8	42.3	47	34	104
White Bass	63	19.9	10.5	±4.5	0.1	54	5	97
Walleye	55	17.4	9.2	±3.6	15.9	16	7	83
Black Bullhead	27	8.5	4.5	±2.2	6.5	52	15	95
White Sucker	25	7.9	4.2	±3.2	6.8	100	64	103
Smallmouth Bass	13	4.1	2.2	±0.7	5.1	18	0	88
Black Crappie	11	3.5	1.8	±1.2	2.2	73	18	110
Bluegill	8	2.5	1.3	±0.7	0.5	--	--	--
Bigmouth Buffalo	6	1.9	1.0	±0.7	2.7	--	--	--
Common Carp	6	1.9	1.0	±0.3	1.2	--	--	--
Northern Pike	6	1.9	1.0	±0.7	0.6	--	--	--
Spottail Shiner	5	1.6	0.8	±0.5	0.5	--	--	--
Channel Catfish	1	0.3	0.2	±0.2	0.6	--	--	--

* (10 years) 1998-2007

Trap Net Catch

Black bullheads (23.9%) were the most abundant species in the trap-net catch (Table 2). Bluegill (18.9%), bigmouth buffalo (15.7%), and black crappie (15.2%) were next in abundance. Nine other species were also sampled.

Table 2. Total catch from 11 overnight trap-net sets at Brant Lake, Lake County July 21-23, 2008.

Species	#	%	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Bullhead	143	23.9	11.9	±6.2	22.6	74	19	91
Bluegill	113	18.9	9.4	±4.3	4.1	100	81	115
Bigmouth Buffalo	94	15.7	7.8	±3.0	3.4	75	13	95
Black Crappie	91	15.2	7.6	±3.2	8.4	89	40	104
Smallmouth Bass	52	8.7	4.3	±1.6	15.3	39	4	85
Common Carp	41	6.9	3.4	±1.2	5.3	88	66	94
Northern Pike	24	4.0	2.0	±0.8	1.0	40	15	83
White Bass	19	3.2	1.6	±1.1	0.0	42	5	88
Walleye	11	1.8	0.9	±0.5	1.5	18	22	86
Yellow Perch	4	0.7	0.3	±0.2	4.5	--	--	--
Channel Catfish	3	0.5	0.3	±0.2	0.6	--	--	--
White Sucker	2	0.3	0.2	±0.1	7.6	--	--	--
Hybrid Sunfish	1	0.2	0.1	±0.1	0.2	--	--	--

* (10 years) 1998-2007

[1] See Appendix A for definitions of CPUE, PSD, RSD-P, and mean Wr.

Walleye

Management objective: Maintain a walleye population with a gill-net CPUE of at least 20, a PSD range of 30-60, and a growth rate of 356 mm (14 inches) by age-3.

Walleye gill-net CPUE decreased and fell below the management objective in 2008 (Table 3). Most of the walleye sampled were younger than age-3 (Table 4), growth rates were average and both growth and condition (Wr) were consistent with previous years (Table 3).

Table 3. Walleye gill-net CPUE, PSD, RSD-P, and mean Wr for Brant Lake, Lake County, 1999-2008.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean*
CPUE	19.3	21.3	20.5	20.7	12.8	12.3	8.5	12.5	20.0	9.2	15.9
PSD	12	9	38	82	13	4	59	44	28	16	30
RSD-P	1	0	4	0	6	2	0	5	13	7	3
Mean Wr	82	89	93	83	81	86	84	85	86	83	85

*10 years (1998-2007)

Table 4. Weighted mean length at capture (mm) for walleye captured in gill nets in Brant Lake, Lake County, 2003-2008. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends. Sample size in parentheses.

Year	1	2	3	4	5	6	7	8	9	10	11	12
2008	243 (55)	332 (18)	419 (30)	-- (3)	--	--	535 (1)	--	644 (2)	--	485 (1)	--
2007	241 (80)	343 (40)	379 (25)	453 (3)	478 (3)	545 (1)	611 (3)	686 (2)	--	--	--	--
2006	258 (50)	257 (26)	394 (2)	417 (6)	442 (7)	478 (6)	500 (1)	-- (1)	692	--	--	--
2005	-- (34)	363 (12)	391 (10)	415 (12)	--	--	--	--	--	--	--	--
2004	258 (49)	303 (14)	331 (9)	-- (25)	--	532 (1)	--	--	--	--	--	--
2003	221 (64)	271 (8)	330 (46)	429 (3)	500 (1)	503 (2)	542 (1)	562 (2)	--	--	--	--

Fall electrofishing indicated that natural reproduction was poor in 2008. However, a large number of age-1 walleyes were captured, surprising since few age-0 walleyes were sampled in fall 2007 and few age-1 fish were captured in summer survey nets. Age-1 walleyes from the large 2007 year class in Lake Madison may have immigrated into Brant Lake. To verify this, age-2 walleyes sampled from 2009 survey nets will be checked for OTC fingerling marks.

The size of age-0 and age-1 walleyes was similar to previous years while the condition of age-0 and age-1 walleyes was lower than usual.

Table 5. Age-0 and age-1 walleyes sampled during 2 hours of nighttime electrofishing on Brant Lake, Lake County, 1996-2008.

Year	Stocking	Age-0 CPH	80% C.I.	% stocked	Mean length (range; mm)	Wr	Age-1 CPH	80% C.I.	Mean length (range; mm)	Wr
2008	none	3	1-5		165 (152-186)	82	39	24-54	264 (228-297)	86
2007	none	40	22-68		188 (156-212)	93	9	5-13	290 (252-310)	89
2006	fingerling	124	98-150	73	170 (136-188)	90	11	4-18	290 (255-324)	88
2005	fry	62[1]	51-73	45	174 (138-209)	94	0	--	-- --	--
2004	none	0	--		-- --	--	2	0-3	266 (236-288)	89
2003	none	20	14-26		176 (156-181)	101	8	6-10	265 (228-274)	89
2002	none	42	21-63		164 (140-183)	98	166	112-219	248 (208-268)	86
2001	none	84	49-118		154 (131-198)	86	1	0-2	319	
2000	none	24	18-30		184 (161-217)	101	5	3-7	295 (269-305)	101
1999	none	86			162 (140-217)		35			
1998	fry	176		98	137 (116-132)		23			
1997	fry	178		93	124 (102-190)		58			
1996	fry	79		92	137 (116-186)		34			

[1] OTC marking revealed that 50% of the age-0 walleyes electrofished from Brant Lake were 2005 fingerling-stocked Lake Madison walleyes that had migrated downstream with the late-summer, high-water conditions (fish exhibited bright fingerling marks).

Yellow Perch

Management objective: Maintain a yellow perch population with a gill-net CPUE of at least 30 and a PSD range of 30-60.

Yellow perch gill-net CPUE increase in 2008, but was still below the management objective (Table 6). However, the size structure of the population is excellent (Figure 2), the fish are in very good condition (Table 6) and growth remains better than statewide, regional, and large lake means (Table 7). Some natural reproduction is occurring annually, but a strong year class has not been produced since 2001. OTC-marked yellow perch fingerlings (103,540), from Blue Dog State Fish Hatchery were stocked in July 2008.

Table 6. Yellow perch gill-net CPUE, PSD, and mean Wr for Brant Lake, Lake County, 1997-2008.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean*
CPUE	32.0	28.0	42.8	124.7	76.6	50.0	28.3	18.0	4.0	15.0	42.3
PSD	67	82	8	93	94	98	63	60	56	47	72
RSD-P	33	28	0	3	15	86	53	39	13	34	33
Mean Wr	97	106	93	99	101	102	102	103	104	104	101

*10 years (1998-2007)

Table 7. Average back-calculated lengths (mm) for each age class of yellow perch in Brant Lake, Lake County, 2008.

			Back-calculation Age							
Year Class	Age	N	1	2	3	4	5	6	7	8
2007	1	45	100							
2006	2	16	107	199						
2005	3	27	104	200	256					
2004	4	2	96	163	193	224				
All Classes		**90**	**102**	**188**	**225**	**224**				
Statewide Mean			86	145	190	220	242			
Region III Mean			94	159	208	242	281			
LLI Mean			86	146	192	225	249			

Smallmouth Bass

Management objective: No management objective has been established.

Smallmouth bass trap-net CPUE decreased this year and is now below the 10-year average (Table 8). The sample was comprised of fish ranging from 14-40 cm (5.5-15.7 in) long (Figure 3), and an average length of 26 cm (10.2 in).

Table 8. Smallmouth bass trap-net CPUE, PSD, RSD-P, and mean Wr from Brant Lake, Lake County, 1999-2008.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean*
CPUE	18.9	4.2	14.0	22.0	5.0	8.7	2.6	51.5	17.4	4.3	15.3
PSD	0	10	35	5	6	19	42	10	10	39	15
RSD-P	0	2	8	0	0	1	17	5	3	4	4
Mean Wr	96	107	103	118	94	103	102	93	98	85	100

*10 years (1998-2007)

Black Crappie

Management objective: Maintain a black crappie population with a trap-net CPUE of at least 10 and a PSD of at least 60.

Black crappie trap-net CPUE increased slightly in 2008 and is similar to the 10-year mean (Table 9). The crappies sampled were 11-31 cm (4.3-12.2 in) long (Figure 4) with an average length of 234 mm (9.2 in). The length-frequency histograms in Figure 4 show three year classes exist in the population. The population has a good size structure and the fish are in excellent condition.

Table 9. Black crappie trap-net CPUE, PSD, RSD-P, and mean Wr from Brant Lake, Lake County, 1999-2008.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean*
CPUE	4.7	4.3	8.1	11.8	23.2	3.9	8.8	9.8	5.8	7.6	8.4
PSD	61	100	97	81	100	100	35	76	94	89	84
RSD-P	14	35	23	0	25	98	26	32	21	40	34
Mean Wr	118	114	121	113	104	99	116	110	109	104	111

*10 years (1998-2007)

All Species

White sucker trap-net CPUE declined this year, probably due to a die off that occurred in 2007 (Table 10). White bass CPUE increased substantially in 2008. CPUE for all other species was within previously observed ranges.

Table 10. Gill-net (GN) and trap-net (TN) CPUE for all fish species sampled in Brant Lake, Lake County, 1998-2007.

Species	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
COS (GN)	0.3	--	--	--	--	--	--	--	--	--
COS (TN)	--	--	--	--	--	--	--	--	--	--
SPS (GN)	--	0.8	0.3	2.3	--	0.3	--	0.8	--	0.8
SPS (TN)	--	--	--	--	--	--	--	--	--	--
COC (GN)	1.7	1.5	0.5	--	1.2	0.3	2.5	0.3	2.5	1.0
COC (TN)	2.8	4.1	1.2	7.7	2.2	17.8	4.8	3.5	6.2	3.4
WHS (GN)	2.3	3.2	6.0	4.3	10.6	17.0	8.5	8.8	5.5	4.2
WHS (TN)	3.7	0.6	2.6	5.1	3.5	4.5	45.1	7.1	0.8	0.2
BIB (GN)	--	--	--	--	0.2	--	3.3	19.3	3.5	1.0
BIB (TN)	1.3	0.2	1.8	3.9	1.5	0.2	0.3	22.0	3.0	7.8
BLB (GN)	3.0	1.5	0.5	6.0	17.2	5.0	9.0	12.5	2.0	4.5
BLB (TN)	1.8	3.1	6.0	15.0	147.5	11.3	9.1	27.0	4.8	11.9
CCF (GN)	0.5	0.3	--	--	1.2	1.5	2.0	--	--	0.2
CCF (TN)	--	0.1	--	--	2.6	0.6	0.3	0.5	1.1	0.3
NOP (GN)	--	0.5	0.3	1.0	--	0.8	0.3	0.8	1.3	1.0
NOP (TN)	2.3	0.3	0.6	2.1	0.5	0.7	--	0.7	0.9	2.0
WHB (GN)	--	--	--	--	--	--	0.5	--	0.3	10.5
WHB (TN)	--	--	0.1	--	--	0.1	--	--	--	1.6
GSF (GN)	--	--	--	--	0.2	--	--	--	--	--
GSF (TN)	--	--	0.1	0.1	--	0.3	--	0.1	--	--
HYB (GN)	0.3	--	--	--	0.4	--	--	--	--	--
HYB (TN)	0.2	--	0.7	0.5	0.5	--	--	--	--	0.1
BLG (GN)	--	--	0.3	1.3	0.6	--	0.3	1.3	0.8	1.3
BLG (TN)	0.3	1.3	3.3	8.8	4.4	4.1	6.8	6.9	4.6	9.4
SMB (GN)	2.8	1.3	3.3	7.0	4.4	3.8	3.5	16.3	8.5	2.2
SMB (TN)	18.9	4.2	14.0	22.2	5.0	8.7	2.6	51.5	17.4	4.3
BLC (GN)	0.3	0.7	--	7.7	3.0	2.8	5.3	2.0	0.5	1.8
BLC (TN)	4.7	4.3	8.1	11.8	23.2	3.9	8.8	9.8	5.8	7.6
YEP (GN)	32.0	28.0	42.8	124.7	76.6	50.0	28.3	18.0	4.0	15.0
YEP (TN)	1.3	5.4	17.7	8.5	8.3	0.7	0.2	0.7	0.2	0.3
WAE (GN)	19.3	21.3	20.5	20.7	12.8	12.0	8.5	12.5	20.0	9.2
WAE (TN)	0.9	0.5	3.2	1.5	2.0	2.3	1.1	1.6	0.8	0.9

COS (Common Shiner), SPS (Spottail Shiner), COC (Common Carp), WHS (White Sucker), BIB (Bigmouth Buffalo), BLB (Black Bullhead), CCF (Channel Catfish), NOP (Northern Pike), WHB (White Bass), GSF (Green Sunfish), HYB (Hybrid Sunfish), BLG (Bluegill), SMB (Smallmouth Bass), BLC (Black Crappie),YEP (Yellow Perch), WAE (Walleye)

Creel Survey Results

Winter 2007-08

Brant Lake provided a winter fishery in 2007-08; however, fishing pressure was down from winter 2006-07. The walleye catch rate dropped to 0.09 fish/hour and the harvest rate was 0.03 fish/hour (Table 12). Only 153 walleyes were harvested and over 75% of those fish were less than 35.6 cm (14 inches) long. Catch and harvest of black crappies was at a 6-year high (Table 11). A few yellow perch and smallmouth bass were also caught during the winter fishery.

Just over 99% of angling parties interviewed were South Dakota residents and about half were primarily targeting walleyes. The highest fishing pressure occurred in January (1,534 hours) and February (1,455 hours). Only a fraction of the total annual fishing pressure occurs in the winter.

Angling parties were asked the question, "What would you consider to be the best daily limit for panfish (perch, crappies, and bluegills)?" The percent that responded to each of the following choices was as follows: 5 (3%), 10 (31%), 15 (23%), 20 (7%), 25 (36%) and 25+ (0%).

Summer 2008

Fishing pressure increased over 2006 and 2007 and was similar to 2003-2005 (Table 13). The months of May and June had the highest fishing pressure. Over 95% of parties interviewed were South Dakota residents and 68% were primarily targeting walleyes.

Walleye catch and harvest rates were similar to past years; however, total catch of walleyes was at a 6-year high (Table 13). Anglers harvested only about 30% of the walleyes caught and 65% of the harvested fish were less than 35.6 cm (14 inches long; Figure 5).

Yellow perch harvest has continued to decline since 2002 (Table 13). Brant Lake provided a modest fishery for black crappies and yielded a few large bluegills. Smallmouth bass catch rates have remained high with anglers harvesting only a small percentage of their catch (13%). About 80% and 97% of the smallmouth bass harvested were less than 12- and 14-inches long, respectively.

Angling parties were asked the question, "What would you consider to be the best daily limit for panfish (perch, crappies, and bluegills)?" The percent that responded to each of the following choices was as follows: 5 (4%), 10 (29%), 15 (21%), 20 (9%), 25 (34%) and 25+ (3%). Response frequencies were very similar between winter and summer anglers.

Table 11. Estimates of fishing pressure and catch (harvest) of fish in Brant Lake from December through March, 2002-2008.

	Fishing Pressure (Hours)	Walleye Catch (Harvest)	Northern Pike Catch (Harvest)	Yellow Perch Catch (Harvest)	Black Crappie Catch (Harvest)	Bluegill Catch (Harvest)
2007-08	4,799	439 (153)	9 (0)	68 (65)	307 (234)	0 (0)
2006-07	6,642	2,482 (473)	6 (0)	31 (10)	0 (0)	0 (0)
2005-06	1,606	0 (0)	0 (0)	9 (9)	5 (0)	0 (0)
2004-05	1,561	0 (0)	5 (5)	0 (0)	0 (0)	0 (0)
2003-04	7,651	1,411 (782)	45 (39)	0 (0)	75 (34)	0 (0)
2002-03	8,098	5,032 (681)	44 (0)	519 (515)	146 (142)	28 (28)

Table 12. Number of angler interviews and estimates of hourly catch rate (harvest rate) of fish in Brant Lake from December through March, 2002-2008.

	Number of Interviews	Walleye Catch (Harvest)	Northern Pike Catch (Harvest)	Yellow Perch Catch (Harvest)	Black Crappie Catch (Harvest)	Bluegill Catch (Harvest)
2007-08	151	0.09 (0.03)	0.002 (0)	0.01 (0.01)	0.06 (0.05)	0 (0)
2006-07	136	0.37 (0.07)	0.001 (0)	0.005 (0.005)	0 (0)	0 (0)
2005-06	46	0 (0)	0 (0)	0.006 (0.006)	0.003 (0)	0 (0)
2004-05	58	0 (0)	0.003 (0.002)	0 (0)	0 (0)	0 (0)
2003-04	155	0.18 (0.10)	0.006 (0.005)	0 (0)	0.01 (0.005)	0 (0)
2002-03	151	0.62 (0.08)	0.005 (0)	0.06 (0.06)	0.02 (0.02)	0.003 (0)

Table 13. Estimates of fishing pressure and catch (harvest) of fish on Brant Lake from May through August, 1998-2008.

Year	Pressure (h)	Walleye Catch (Harvest)	Bluegill Catch (Harvest)	Yellow Perch Catch (Harvest)	Black Crappie Catch (Harvest)	SM Bass Catch(Harvest)
2008	30,627	9,522 (2,769)	265 (230)	410 (300)	2,281 (1,757)	5,359 (722)
2007	14,857	3,216 (2,079)	46 (46)	536 (420)	417 (311)	6,524 (958)
2006	22,053	6,372 (1,618)	1,295 (691)	1,075 (525)	1,766 (1,150)	6,841 (1,087)
2005	31,760	5,022 (4,063)	502 (197)	1,821 (1,532)	684 (555)	1,466 (290)
2004	30,658	8,640 (4,855)	371 (354)	2,762 (2,596)	6,101 (5,710)	2,003 (727)
2003	28,220	34,715 (4,181)	388 (39)	11,301 (8,262)	9,686 (5,847)	5,146 (1,278)
2002	44,346	12,102 (3,368)	2,124 (993)	27,829 (21,437)	10,150 (4,284)	5,772 (1,335)
2001	29,843	6,878 (3,914)	0 (0)	598 (208)	528 (528)	1,479 (1,006)
2000	17,966	11,167 (2,795)	23 (23)	3,171 (2,536)	2,989 (1,023)	2,232 (131)
1999	13,634	9,609 (1,078)	0 (0)	1,220 (578)	306 (184)	2,180 (165)
1998	14,257	11,320 (591)	0 (0)	461 (299)	1,133 (674)	2,352 (201)

Table 14. Number of interviews and estimates of catch and harvest rates (number/hour) on Brant Lake from May through August, 1998-2008.

Year	Number of Interviews	Walleye Catch (Harvest)	Bluegill Catch (Harvest)	Yellow Perch Catch (Harvest)	Black Crappie Catch (Harvest)	SM Bass Catch (Harvest)
2008	271	0.31 (0.09)	0.009 (0.008)	0.01 (0.01)	0.07 (0.06)	0.18 (0.02)
2007	123	0.22 (0.14)	0.003 (0.003)	0.04 (0.03)	0.03 (0.02)	0.44 (0.06)
2006	257	0.29 (0.07)	0.06 (0.03)	0.05 (0.02)	0.08 (0.05)	0.31 (0.05)
2005	288	0.16 (0.13)	0.02 (0.006)	0.06 (0.05)	0.02 (0.02)	0.05 (0.009)
2004	464	0.28 (0.16)	0.01 (0.004)	0.09 (0.08)	0.20 (0.19)	0.07 (0.02)
2003	285	1.23 (0.15)	0.01 (0.001)	0.40 (0.29)	0.34 (0.21)	0.18 (0.05)
2002	448	0.27 (0.08)	0.05 (0.02)	0.63 (0.48)	0.23 (0.10)	0.13 (0.03)
2001	203	0.23 (0.13)	0 (0)	0.02 (0.01)	0.02 (0.02)	0.05 (0.03)
2000	164	0.62 (0.16)	0.001 (0.001)	0.18 (0.14)	0.17 (0.06)	0.12 (0.01)
1999	185	0.70 (0.08)	0 (0)	0.09 (0.04)	0.02 (0.01)	0.16 (0.01)
1998	190	0.79 (0.04)	0 (0)	0.03 (0.02)	0.08 (0.05)	0.17 (0.01)

Carp Research and Commercial Fishing

This is the second year of a five year SDSU research project gathering information on common carp in Lakes, Herman Madison, and Brant. In spring 2008, 2,960 carp were tagged. This fall, 62,000 pounds of carp were removed by commercial fishermen. Twenty-five carp have surgically implanted transmitters and are being tracked by researchers.

MANAGEMENT RECOMMENDATIONS

1. Continue annual netting surveys to monitor the general fish population and annual fall electrofishing surveys to monitor walleye recruitment and smallmouth bass populations.

2. Maintain the walleye population by stocking fry or fingerlings when natural reproduction fails.

3. Consider yellow perch stocking and spawning habitat enhancement to fill voids of poor reproduction. Develop hatchery production methods to provide large numbers of yellow perch fry and fingerlings for stocking. To enable stocking evaluations, adult perch should be fin clipped. Fry and fingerling perch should be marked with OTC prior to release. Marked fish will be monitored through annual lake surveys.

4. Adult crappie stockings have been ineffective and were discontinued. Past research has indicated that a lack of wind protected spawning habitat may limit natural reproduction. Investigate the use of artificial structures to enhance spawning habitat and the use of barriers to protect crappie spawning areas from the destructive activities of common carp.

5. The Brant Lake Association has expressed interest in cooperating with GFP to work on habitat projects in the lake. We should develop a preliminary habitat improvement plan that includes Christmas trees for perch spawning and shoreline brush piles for crappie, bass and bluegill benefits.

Table 15. Stocking record for Brant Lake, Lake County, 1997-2008.

Year	Number	Species	Size
1997	1,620	Black Crappie	Adult
	98,700	Bluegill	Fingerling
	1,974,000	Walleye	Fry
	4,024	Yellow Perch	Adult
1998	1,974,000	Walleye	Fry
1999	12,089	Black Crappie	Juvenile
	20,528	Yellow Perch	Juvenile
	8,225	Yellow Perch	Adult
2000	47,044	Yellow Perch	Juvenile
2001	8,992	Yellow Perch	Adult
2002	16,929	Yellow Perch	Juvenile
	700	Yellow Perch	Adult
2004	6,885	Yellow Perch	Fingerling
2005	385,950	Walleye	Fry
2006	104,910	Walleye	Sml. Fingerling
	3,582	Yellow Perch	Fingerling
2007	30,825	Yellow Perch	Fingerling
	4,000	Fathead Minnow	Adult
2008	103,540	Yellow Perch	Fingerling

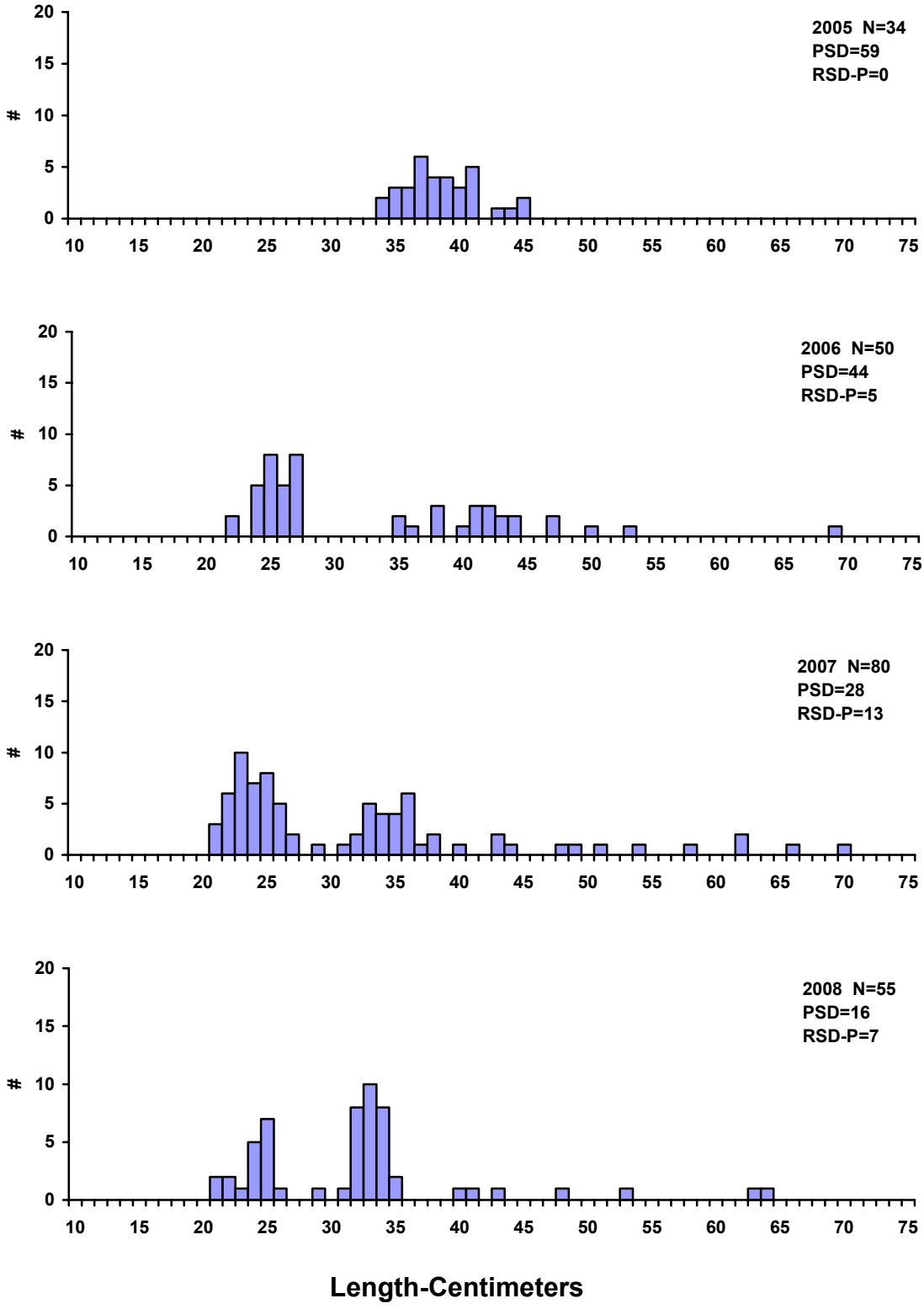

Figure 1. Length frequency histograms for walleyes sampled with gill nets in Brant Lake, Lake County, 2005-2008.

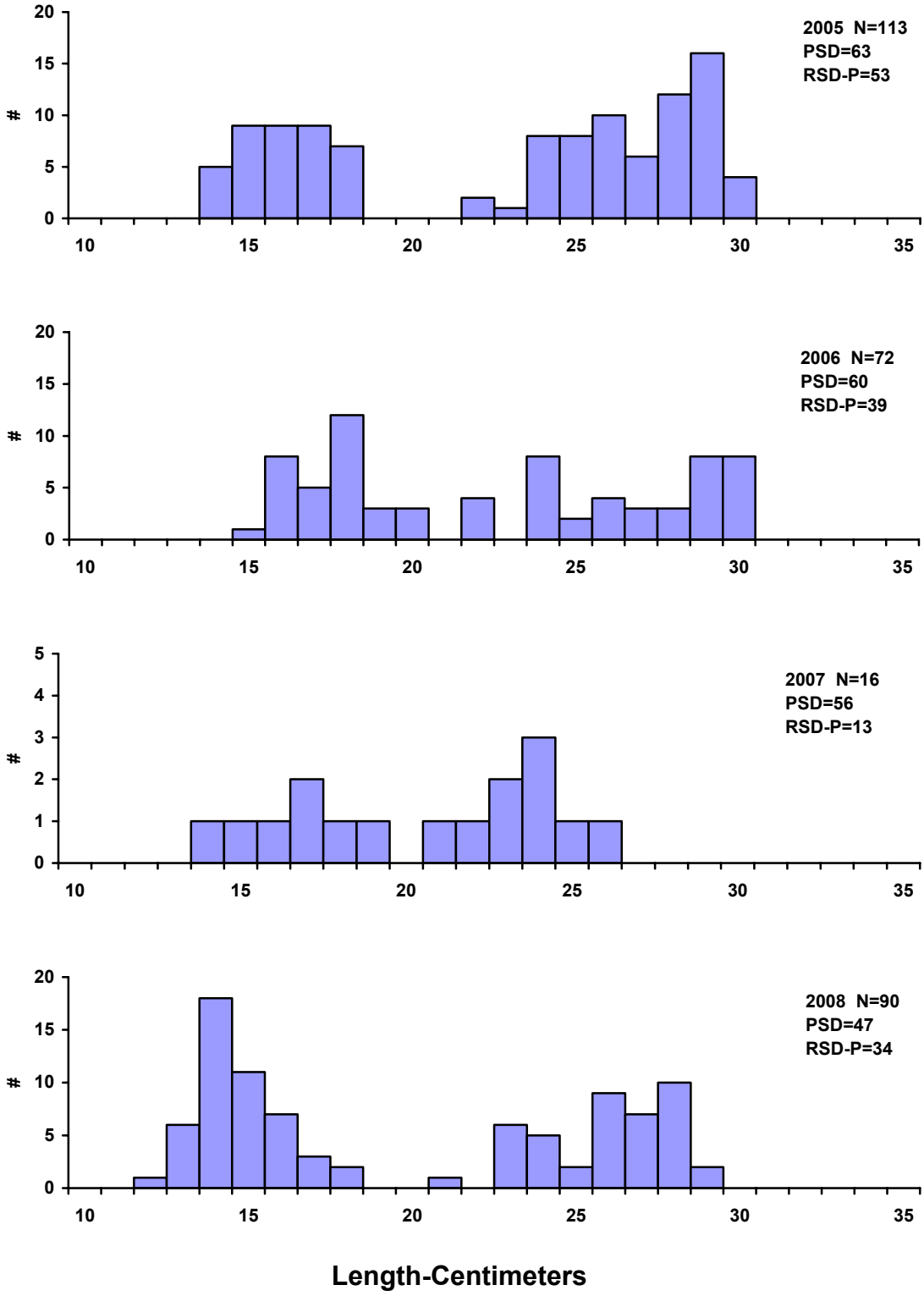

Figure 2. Length frequency histograms for yellow perch sampled in gill nets in Brant Lake, Lake County, 2005-2008.

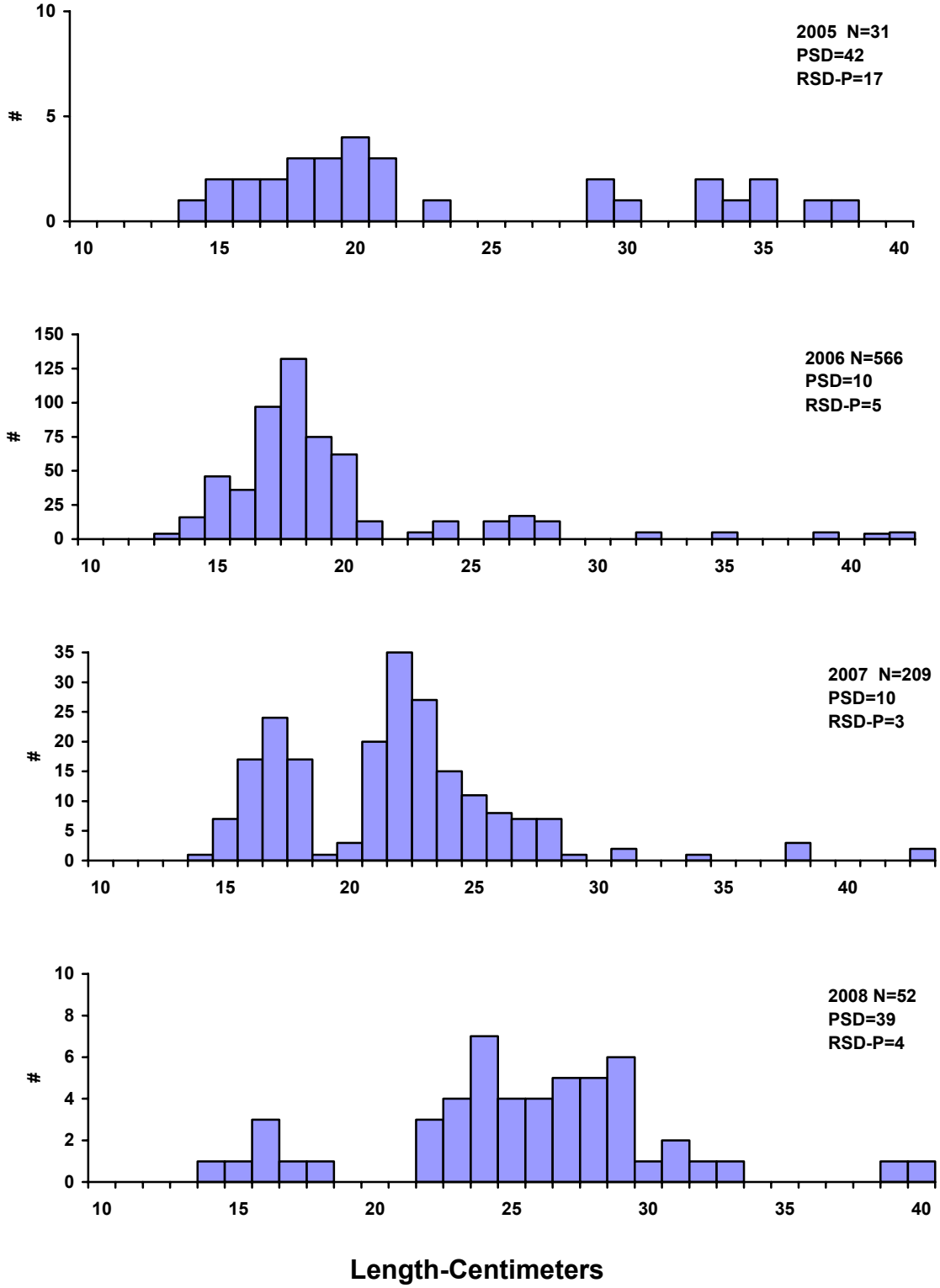

Figure 3. Length frequency histograms for smallmouth bass sampled with trap nets from Brant Lake, Lake County, 2005-2008.

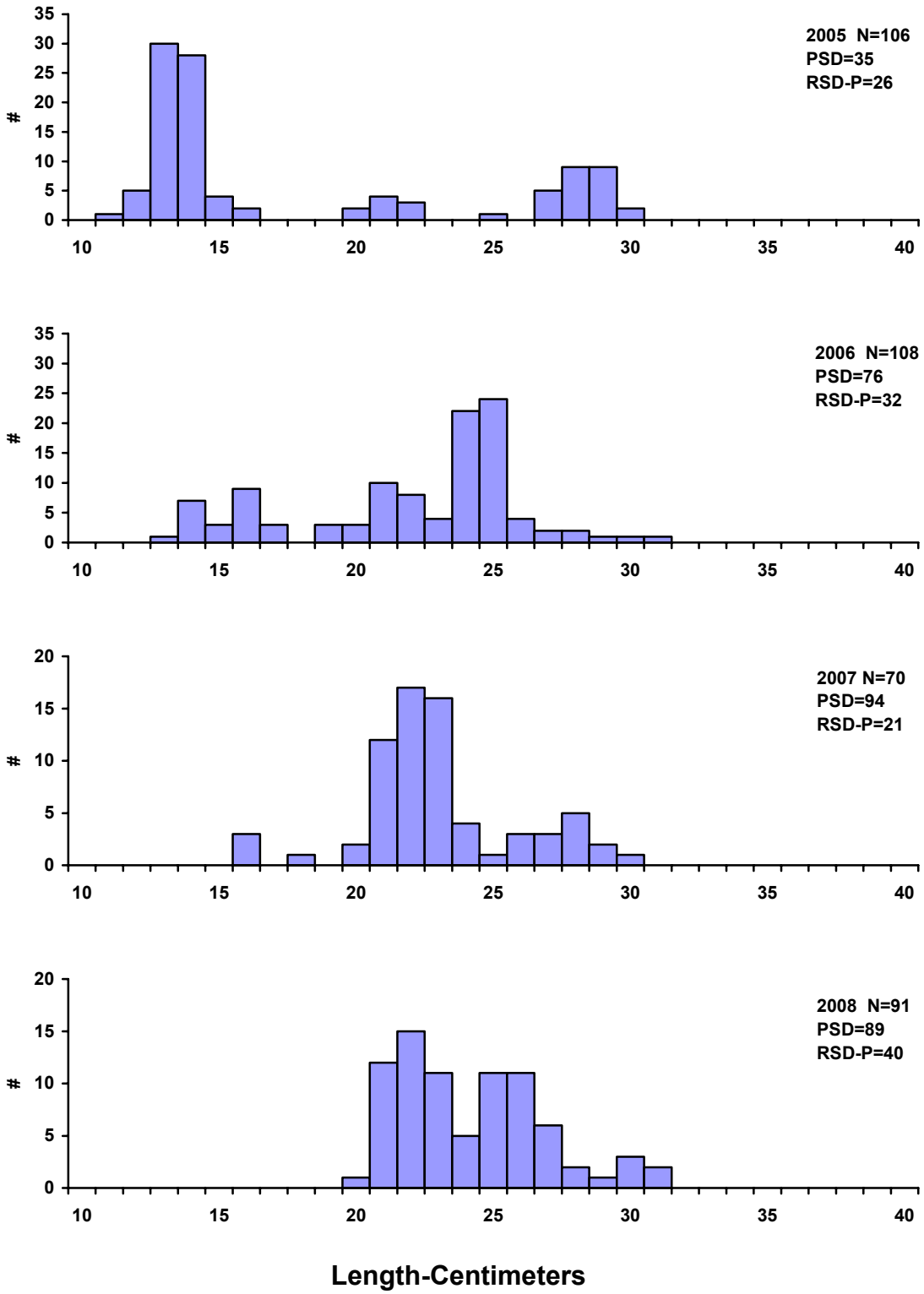

Figure 4. Length frequency histograms for black crappies sampled with trap nets in Brant Lake, Lake County, 2005-2008.

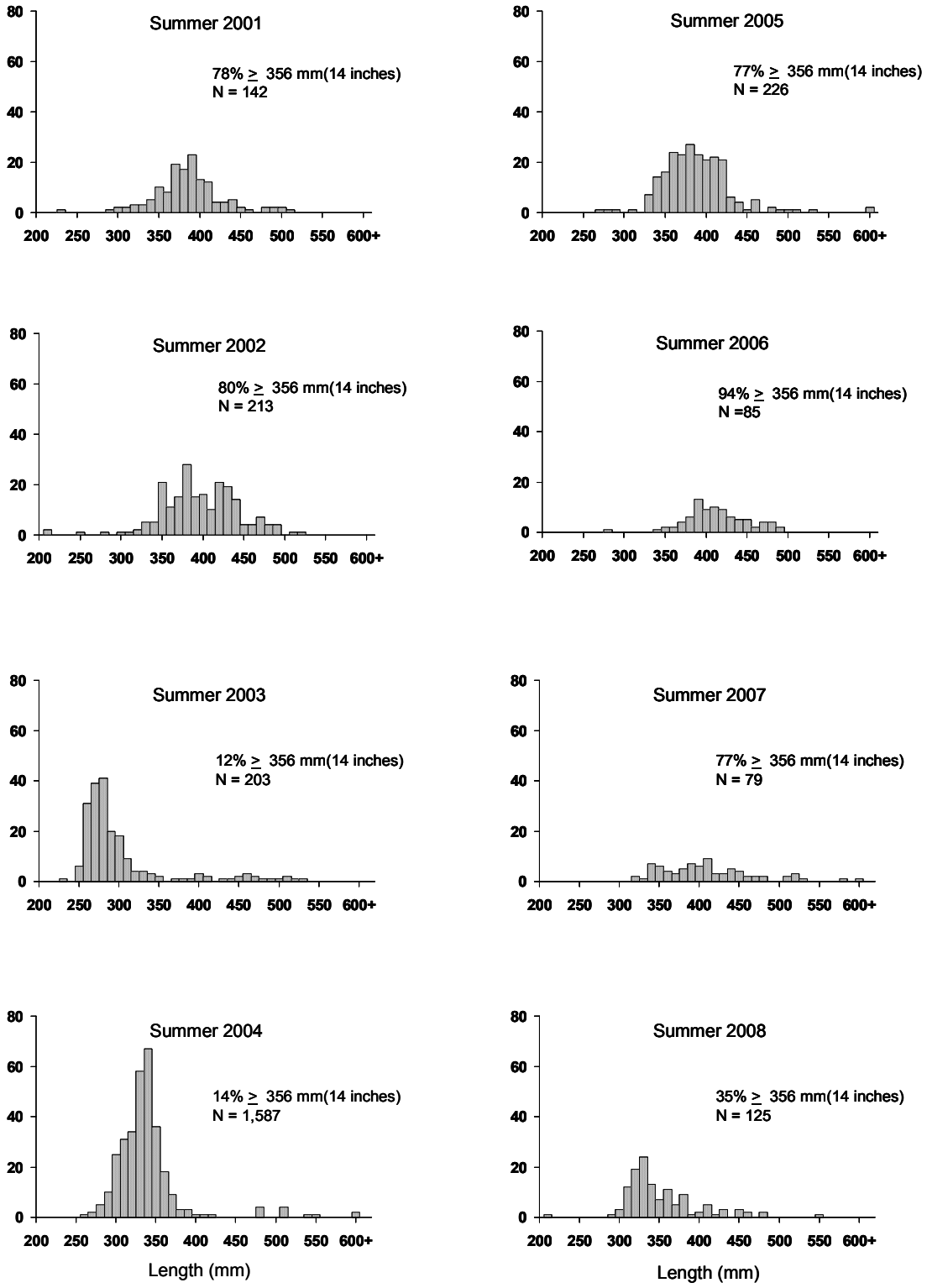

Figure 5. Length frequency of angler-harvested walleyes measured by the creel clerk during summer creel surveys on Brant Lake, 2001-2008.

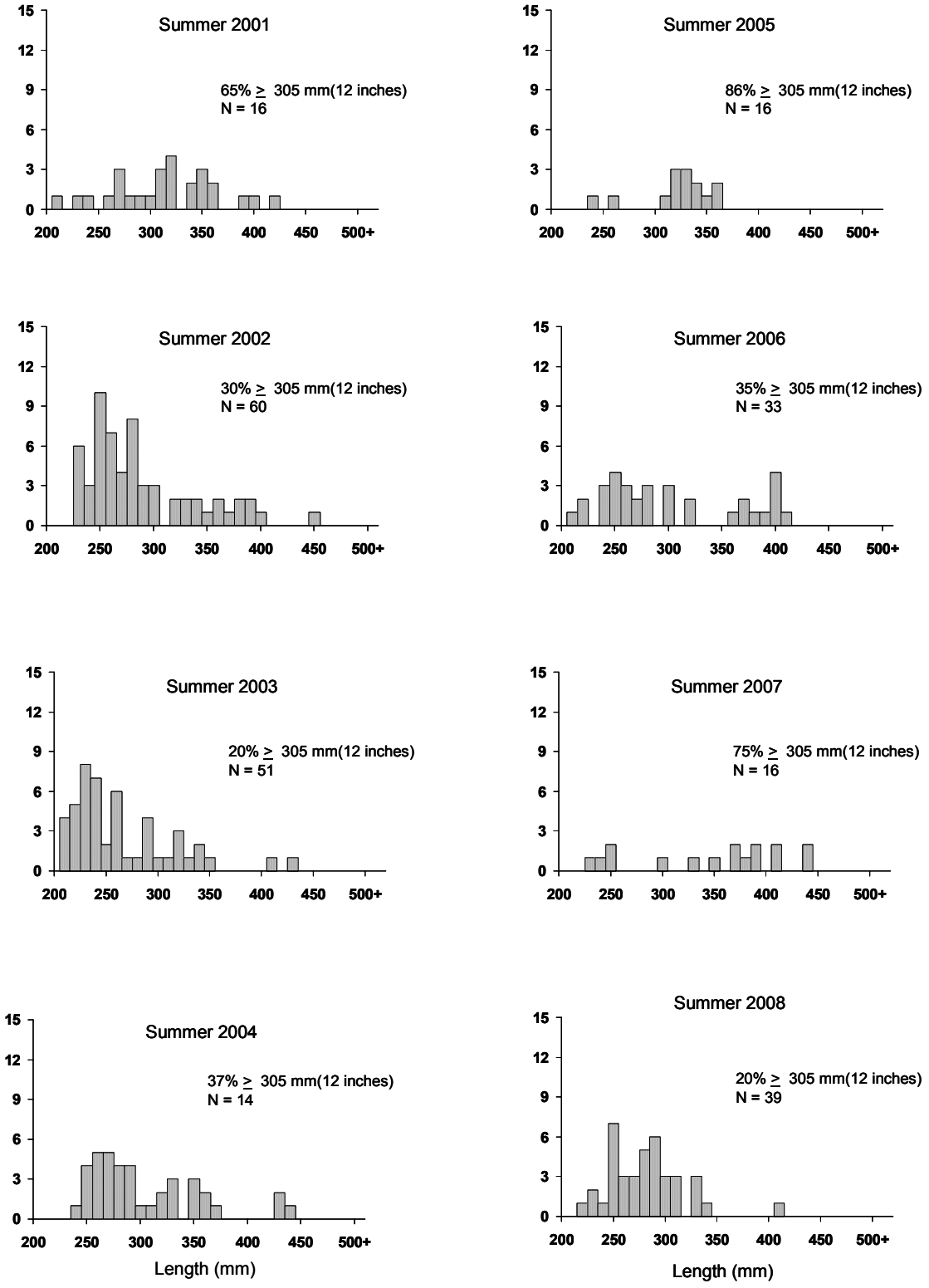

Figure 6. Length frequency of angler-harvested smallmouth bass measured by the creel clerk during summer creel surveys on Brant Lake, 2001-2008.

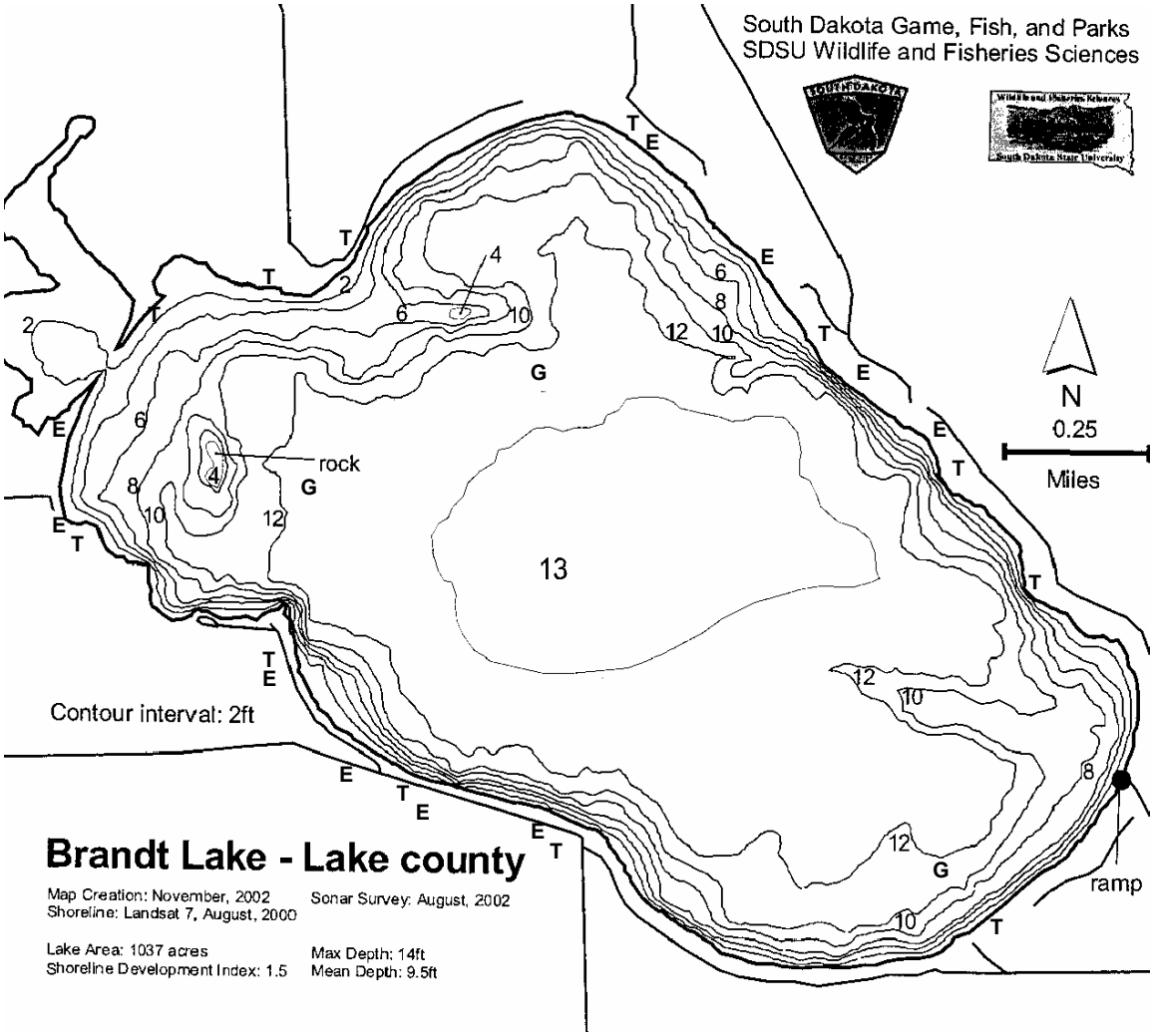

Figure 7. Sampling locations on Brant Lake, Lake County, 2008.

Appendix A. A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

Catch Per Unit Effort (CPUE) is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

Proportional Stock Density (PSD) is calculated by the following formula:

$$PSD = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

Relative Stock Density (RSD-P) is calculated by the following formula:

$$RSD\text{-}P = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters.

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25	38	51	63	76
Sauger	20	30	38	51	63
Yellow perch	13	20	25	30	38
Black crappie	13	20	25	30	38
White crappie	13	20	25	30	38
Bluegill	8	15	20	25	30
Largemouth bass	20	30	38	51	63
Smallmouth bass	18	28	35	43	51
Northern pike	35	53	71	86	112
Channel catfish	28	41	61	71	91
Black bullhead	15	23	30	38	46
Common carp	28	41	53	66	84
Bigmouth buffalo	28	41	53	66	84
Smallmouth buffalo	28	41	53	66	84

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative weight (Wr) is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.